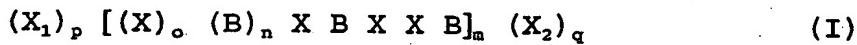


## CLAIMS

1) An amino acid sequence being able to facilitate penetration of a substance of interest inside cells and/or 5 cell nuclei and having the following formula :



Wherein

$X_1$  and  $X_2$  are amino acid sequences of 1 to 20 amino acids;

10 p and q are whole numbers between 0 and 5;

B is a basic amino acid;

X is a non-basic, preferably hydrophobic amino acid, such as alanine, isoleucine, leucine, methionine, phenylalanine, tryptophan, valine or tyrosine;

15 n is 2 or 3;

m is 1 to 4;

o is 0 or 1.

20 2) An amino acid sequence according to claim 1, wherein :

- o is 1, and/or

- p or q is 0, and/or

-  $X_1$  or  $X_2$  is a sequence of 2 to 5 amino acids, and/or

- n is 2 or 3, and/or

25 - m is 2.

3) An amino acid sequence according to any of claims 1 or 2 having one the following formula :



30  $(X_1)_p X B B B X B X X B X B B B X B X X B \quad (III)$

wherein  $X_1$ , X, B and p have the same meaning as in claim 1.

4) An amino acid sequence according to any of claims 1 to 3 having less than 100 amino acids.

5) An amino acid sequence according to any of claims 1 to 3 having between 7 to 25 amino acids.

6) An amino acid sequence according to any of claims 1 to 3 having between 7 to 15 amino acids.

10 7) An amino acid sequence according to any of claims 1 to 3 having between 15 to 25 amino acids.

8) An amino acid sequence according to any of claims 1 to 5 or to claim 7 having one the following formula:

15 - Leu Arg Arg Glu Arg Gln Ser Arg Leu Arg Arg Glu Arg Gln Ser Arg (SEQ ID NO.1)

- Gly Ala Tyr Asp Leu Arg Arg Arg Glu Arg Gln Ser Arg Leu Arg Arg Arg Glu Arg Gln Ser Arg (SEQ ID NO.2).

20 9) An amino acid sequence according to any of the preceding claims, characterized by the fact that it binds to a component on the cell membrane and crosses said cell membrane via said component.

25 10) An amino acid sequence according to any of the preceding claims, characterized by the fact that it is capable of reacting with the aminoglycans.

30 11) An amino acid sequence according to claim 10, characterized by the fact that it is capable of reacting with the glycoaminoglycans.

12) The amino acid sequence according to any of claims 10 or 11, characterized by the fact that it is capable of

reacting with heparin, chondroitine sulfates and their derivatives.

13) An amino acid sequence according to any of the  
5 preceding claims, coupled to at least one second amino acid sequence deriving from an antibody fragment, advantageously a polyreactive antibody fragment.

14) The amino acid sequence according to claim 13,  
10 wherein the second amino acid sequence is all or part of a hypervariable region of an antibody.

15) An amino acid sequence according to any of claims 13 or 14, wherein the second amino acid sequence is a  
15 fragment of the heavy chain of an antibody.

16) An amino acid sequence according to any of claims 13 to 15, wherein the second amino acid sequence is a human anti-DNA antibody or part thereof.

20 17) The amino acid sequence of claim 16, wherein said antibody is chosen among the group comprising IgM and IgG.

25 18) The amino acid sequence of claim 13, wherein the second amino acid sequence is chosen in the group comprising all or part of a CDR2, CDR3 region of an antibody.

30 19) The combination of an amino acid sequence according to any one of claims 1 to 18 with a substance of interest.

20) The use of an amino acid sequence according to any one of claims 1 to 18 to prepare a composition for the transfer of a substance of interest into cells.

- 21) A vector for intracytoplasmic and/or intracytosolic and/or intranuclear in vivo transfer of a substance of interest, constituted by or comprising at least 5 one amino acid sequence according to any of claims 1 to 18.
- 22) The vector of claim 21 coupled to at least one substance of interest that can be incorporated naturally or non-naturally into cells and/or the nuclei of said cells.
- 10 23) The vector of claim 22, wherein said substance of interest is coupled at N or C terminal end of the amino acid sequence.
- 15 24) A vector according to any of claims 21 to 23, wherein the substance of interest is chosen from the group comprising nucleic acid, protein, drug, antigen, antibody, polymer, marker such as fluorochrome.
- 20 25) A vector according to any of claims 21 to 24, wherein the substance(s) of interest is (are) coupled to said vector via at least one anchoring molecule having a strong natural affinity for said substance of interest.
- 25 26) A vector according to any of claims 21 to 24, wherein the substance(s) of interest is (are) coupled to said vector by genetic engineering or by chemical, biochemical, enzymatic coupling.
- 30 27) An eukaryotic cell containing an amino acid sequence according to any one of claims 1 to 18 or a vector according to any of claims 21 to 26.

28) A biological, pharmaceutical, cosmetic, agro-food, diagnostic or tracking composition, comprising as active ingredient an amino sequence according to any of claims 1 to 18, a vector according to any of claims 21 to 26 or an 5 eukaryotic cell according to claim 27.